

**U.S. EPA REGION 5
MIDWESTERN EPHEMERAL WETLANDS: A VANISHING HABITAT
CONFERENCE**

PRESENTATION ABSTRACTS

February 20, 2002

10:00 An Overview of Ephemeral Wetlands

Paul H. Zedler, University of Wisconsin - Madison, 550 Park St., 70 Science Hall, Madison WI

It is a common situation for the input of water into small basins to exceed the rate of loss from outflow, evaporation, and infiltration for only a portion of the year. Thus ephemeral bodies of water are found in every part of the world in a bewildering variety of local variations. They have also been an element of terrestrial landscapes since the origins of life. A distinctive group of organisms have evolved to be specialized for ephemeral wetlands, and for others they are important habitat. Though always of interest to specialists, it is only relatively recently that ephemeral wetlands have been generally appreciated as reservoirs of biodiversity and critical habitat. Their conservation and management is simplified by their generally small size and modest hydrological requirements, but complicated because of their close interactions with surrounding upland habitats and their frequent occurrence on sites favored for development. The best protection of ephemeral wetlands is afforded when they are the habitat for endangered species. But even if they do not contain rare species, ephemeral wetlands still have functional importance in local and regional ecosystems. The challenge is to understand and quantify this importance.

10:45 Cumulative Impacts of Small Wetland Losses on Avian Biodiversity

David Naugle*¹ and Kenneth F. Higgins², ¹University of Montana School of Forestry, 32 Campus Drive, Missoula MT, ²South Dakota Cooperative Fish and Wildlife Research Unit, U.S. Geological Survey-Biological Resources Division, South Dakota State University, Brookings SD

Conservation planners advocating ephemeral wetlands preservation acknowledge the current lack of evidence to support the value of small wetlands. We assessed cumulative impacts of ephemeral wetland losses on bird diversity in eastern South Dakota, a glaciated prairie landscape where ~80% of wetlands are <0.5 ha in size. Discriminant function models were constructed for 20 species using bird surveys from 1075 wetlands. Predictor variables were landscape attributes that were quantified using digital National Wetlands Inventory data and Landsat TM Imagery. Protected wetlands were located within federal or state easement and fee-title tracts (n=14840). Models were used to classify habitat suitability of the 183607 semipermanent and seasonal wetlands. We conducted two simulations to evaluate the effect of the loss of ephemeral wetlands on suitability of remaining larger wetlands. In the first simulation, all small (<0.50 ha) wetlands, regardless of protected status, were removed, whereas in the second simulation,

only unprotected small wetlands were removed. Models were used to reclassify suitability of larger remaining wetlands in each simulation. Average number of suitable wetlands for vagile species that exploited resources over broad spatial scales decreased almost 20% when all small wetlands were removed. Decreases in numbers of previously suitable wetlands were greatest in smaller size classes (0.5-5.0 ha) because area-dependent species became increasingly dependent on characteristics of the surrounding landscape as wetland size decreased. Number of suitable 1-2 ha wetlands increased 10% when protected small wetlands were not removed. Our findings indicate that small wetlands, when viewed as components of a larger wetland complex rather than as individual patches, are critical landscape elements that influence suitability of larger wetlands. Wetland acquisition programs that target small wetlands would preserve habitat suitability of larger wetlands while protecting the segment of our wetland resource currently at greatest risk.

11:10 Use of Ephemeral Wetlands by Blanding's Turtles, *Emydoidea blandingii*

Gary S. Casper, Section of Vertebrate Zoology, Milwaukee Public Museum, 800 W Wells St., Milwaukee WI

Blanding's Turtles, *Emydoidea blandingii*, are listed as state special concern, threatened or endangered species in most states in which they occur. Long distance movements are common. Multiple habitat use by this species necessitates maintenance of habitat patch connectivity in conservation planning. Habitat use and movement patterns in two populations in southeastern Wisconsin were intensively studied via radio telemetry for several years. In one population with only pond habitat available, seasonal patterns of wetland use varied among deep ponds and ephemeral wetlands. In the second population, lake, shallow marsh, open bog mat, deep ponds, and ephemeral wetlands were available, and turtles showed seasonal preferences in habitat use, typically utilizing ephemeral wetlands heavily in early spring. Biological connectivity of ephemeral wetlands with other habitats up to 1 km distance is demonstrated. This has conservation implications regarding development, road building, movement barriers, and habitat fragmentation.

1:00 Patterns of Ephemeral Wetland Use by Wood Frogs (*Rana sylvatica*)

Catherine M. Johnson* and Lucinda B. Johnson, Natural Resources Research Institute, University of Minnesota, 5013 Miller Trunk Highway, Duluth MN

Vernal pools provide essential habitat for many faunal species, including breeding habitat for many woodland amphibians. We compared amphibian communities and wetland characteristics (physical, chemical and biotic) for 36 vernal pools located in fragmented and unfragmented forest patches in Duluth, Cloquet, and Grand Rapids, Minnesota. Landscape data were summarized for areas within a 1 km buffer of each study site, based on aerial photo-interpretation. All study sites were visited three times during 2000 and 2001 to conduct amphibian and macro-invertebrate surveys and to quantify physical habitat parameters, including hydroperiod, water chemistry, and microclimate conditions;

vegetative communities were quantified in 2000. A mark-recapture effort, focused on wood frogs (*Rana sylvatica*) and blue-spotted salamanders (*Ambystoma laterale*), also was undertaken at the eight Cloquet sites in both years. While frogs were heard calling at most sites during calling surveys, egg masses were not found in all those sites; furthermore, several sites where egg masses were observed apparently failed to produce metamorphs. Preliminary analyses of our mark-recapture data indicate that a large number of frogs moved among wetlands in the local landscape both within and between years. Over 40% of wood frogs recaptured in 2001 occurred in wetlands other than the pool in which they were originally marked, and a small percentage were recaptured > 2 km from their original location.

1:20 The Use of Ephemeral Ponds for Salamander Breeding in Southern Michigan

James C. Ball, 1083 Jewell Road, Milan MI

In the winter/spring of 1997, 1999, and 2001 five ponds were sampled with minnow traps over the breeding season of blue-spotted salamanders (*Ambystoma jeffersonianum-laterale* Complex) and spotted salamanders (*Ambystoma maculatum*) as well as significantly overlapping the breeding season eastern newts (*Notophthalmus viridescens*). Systematic mark-recapturing was done all three years for the blue-spotted salamanders and the latter two years for eastern newts. Approximately 800 blue-spotted salamanders, 150 eastern newts, 50 spotted salamanders, and an occasional tiger salamander were caught each year of the study. The snout-vent length, total length, and mass of these salamander populations were not significantly different from in 1997 and 1997 but blue-spotted salamanders were significantly larger in 2001. These salamanders were not significantly different from similar population in adjacent states and provinces. Of the five possible ponds available for breeding, blue-spotted salamanders preferred pond 3 while newts preferred pond 5 in 1997 and 1999. The newt population crashed at Pond 5 in 2001 for unknown reasons. Spotted salamanders used primarily ponds 3 and 5. The peak time for arrival at the ponds varied from year to year and seemed to depend heavily on weather. A study of the natural history of the breeding migrations of these salamanders may yield insights into their ecological preferences for breeding ponds and migration behaviors.

1:40 "Large" Branchiopods of the Midwest

Stephen Weeks, Department of Biology, The University of Akron, Akron OH

Branchiopods are primitive crustaceans with bodies with a series of undifferentiated "phyllopod" appendages used for respiration, swimming, and filter feeding. Non-cladoceran branchiopods (termed "large branchiopods") are ubiquitous, but poorly studied. This grouping contains Anostracans (fairy shrimp), Conchostracans (clam shrimp), and Notostracans (tadpole shrimp). Fairy and clam shrimp have the most species, with tadpole shrimp having less 5 species in North America. Large branchiopods specialize on temporary pools that dry or freeze at least once per year.

Fairy shrimp are primarily limnetic filter feeders, and range in size from 1 - 5 cm. Clam shrimp are benthic filter feeders and detritivores on pond bottom material. Both are locally abundant, when found, and fairy shrimp are important food sources for migratory birds. In the Midwest, we have 15 species of fairy shrimp representing five families and five genera. Surveys in Ohio revealed one common species (*Eubbranchipus neglectus*), found from temporary pools in suburban areas to wooded ponds in parks, and one rarer species (*E. bundyi*), found only in wooded sites. Two other species (*E. holmani* and *E. serratus*) were not found. We also have nine species of clam shrimp in the Midwest, representing two orders, four families, and four genera. In the two-year Ohio survey, only one of the four previously reported species (*C. gynecia*) was found in a state forest. We concluded that development of temporary wetlands selects for extremely hardy large branchiopods, such that most of our large branchiopod species in Ohio will soon be lost (if they aren't already extirpated).

2:00 Ephemeral Wetland Crayfishes of the Midwest

Christopher A. Taylor, Illinois Natural History Survey, 607 E Peabody,
Champaign IL

Crayfishes are a diverse and important component of North American aquatic biodiversity. They have colonized every type of aquatic habitat, including ephemeral wetlands. This talk will cover the taxonomic diversity of midwestern crayfishes that inhabit ephemeral wetlands. Life history, conservation, and identification of these species will also be addressed.

2:20 Approaches for Biological Assessments of Ephemeral Wetlands in Minnesota

Judy Helgen*, Craig Prudhomme and Cheryl Miller, Minnesota Pollution Control
Agency, 520 Lafayette Rd, St Paul MN

Minnesota Pollution Control Agency (MPCA) has developed an index of biological integrity (IBI) for assessing the quality of depressional wetlands based on aquatic invertebrates. This multimetric index could be modified for the ephemeral class of wetlands by sampling sites that represent a gradient of human disturbance from the least impaired to severely disturbed. The data for the component metrics for the IBI are regressed against measures of the human disturbance gradient. The invertebrate IBI scores for larger depressional wetlands decline significantly with specific chemical and composited measures of human disturbance. A new, preliminary effort initiated by MPCA with MN Audubon Center of the North Woods and Minnesota Audubon in May, 2001 trains teachers to work with students to locate and identify ephemeral wetlands. The biological protocol includes surveys of frog calls and dipnetting the site for invertebrates. The kinds of organisms are recorded on data sheets that define them as obligate, obligate/facultative, or facultative. Draft criteria, modified from those used by Massachusetts Heritage Program to be more appropriate for ephemeral wetlands in Minnesota, are used for identifying whether the site is an ephemeral wetland. Revisions are expected as the work develops. In addition, physical and habitat data are recorded,

the site is sketched, and compass directions are used with landmarks to locate the site. The ultimate goal is to have the teachers and students present their findings to a local government entity to provide awareness of and some protection for vulnerable ephemeral wetlands.

3:10 Field Identification of Ephemeral Wetlands during Drier Portions of the Growing Season

Donald Reed, Southeastern Wisconsin Regional Planning Commission, 916 N. East Avenue, P.O. Box 1607, Waukesha WI

Ephemeral wetlands are characterized by their seasonal hydrologics. As such, they are identified as problem areas in the 1987 Corps of Engineers Wetlands delineation Manual.

During the early portion of the growing season, all three wetlands parameters are present and clearly identifiable in these wetlands. However, during the latter - and usually drier-portion of the growing season, the hydrology and/or hydrophytic indicators may be absent. Short-lived, facultative upland vegetation may become dominate in the herbaceous layers (a temporary FACU dominated wetland condition). Further, a description of the hydrology parameter may be limited to the use of secondary indicators and vegetative morphologies.

3:30 Indicating Amphibian Habitat Quality: Macroinvertebrate Diversity, Physical-chemical Conditions, and Amphibian Diversity

Kathryn Kiehl* and David Jenkins, Department of Biology, University of Illinois at Springfield, 1670 Seven Pines RD, Springfield IL

Amphibians are important components of biodiversity and natural resource conservation efforts in our watersheds. Because amphibian diversity and population size are reported to be declining, conservation and restoration efforts need to better identify and understand factors that contribute to amphibian habitat quality. Many studies have focused on specific habitat components, species competition, and predation. However, a means to quantitatively indicate amphibian habitat quality is lacking. We hypothesized that amphibian habitat quality can be indicated by macroinvertebrate species diversity, physical-chemical conditions, and the presence of other amphibians because amphibians and macroinvertebrates are sensitive to physical-chemical conditions, as well as predator-prey interactions. We sampled a variety of habitat conditions based on expected canopy cover (open, mixed, closed) and hydroperiod (short, medium, long). Biweekly sampling of macroinvertebrates, water chemistry, amphibian presence and success was conducted from early March to November 2001. Preliminary results indicate that there is indeed a habitat quality gradient, in which some ponds are more productive than others in amphibian breeding success, diversity, and richness. Furthermore, analysis of water chemistry data also indicates a separation of sites based on their openness and hydroperiod. Macroinvertebrate and physical-chemical results are expected to provide increased insight for indicating amphibian habitat quality. Support of our hypothesis

may significantly influence wetland conservation and construction and enhance wetland assessment and delineation.

3:50 An Overview of Region 5's Advanced Identification of Wetlands Program

Sue Elston, Wetland Coordinator, USEPA Region 5, 77 W Jackson, Chicago, IL

The Advanced Identification, or ADID process is a program designed to provide improved awareness of the locations, functions and values of wetlands and other waters of the U.S. More specifically, it is intended to inform landowners, developers, and local governments that it may not be appropriate to fill certain high quality wetland sites. ADID projects can also provide guidance on strategies for long term protection and management of aquatic resources for a geographical area.. USEPA conducts the ADID process in cooperation with federal, state and local agencies. ADID projects which are on going or recently completed in the Chicago area have focused on evaluating biological functions of wetlands and on water quality/stormwater storage functions. Development of the evaluation methodologies and use of final products of local ADID projects will be discussed.

4:10 Mapping Vernal Pools in Massachusetts

Robert Brooks*¹ and Matthew R. Burne², ¹USDA Forest Service, Northeastern Research Station, University of Massachusetts, Amherst MA, ²MA Natural Heritage & Endangered Species Program, Route 135, Westborough MA

Massachusetts a history of recognizing and protecting vernal pools that is almost two decades in length. Following the recognition of the importance of vernal pools in a 1983 salamander survey, efforts were begun to protect the wildlife habitat function of vernal pools. Initial success was achieved in 1987 through an amendment of the state's Wetlands Protection Act. In that legislation, vernal pools that were identified and certified and were located in a wetland resource area (e.g., bordering vegetated wetlands) were protected. Pools in uplands, even if certified, received no protection under these regulations. Pool certification guidelines, developed by the Massachusetts Heritage Program, are based on the pool occurring in a confined basin depression with no permanently flowing outlet and the documentation of a pool's use by or more indicator fauna. Concurrent with the beginnings of state protection of vernal pools, a program of vernal pool education, begun in the Reading, Massachusetts's schools by Leo Kenney, was expanding and led to the formation of the Vernal Pool Association (VPA; www.vernalpool.org). The VPA has raised general public awareness of vernal pools across Massachusetts, throughout New England, and beyond. The protection of vernal pools in Massachusetts now occurs not only in the Wetlands Protection Act, but also in regulations governing surface water quality, riverfront areas, forest cutting, and septic systems. However, the focus of this protection is still the pool and does not include the upland component of vernal pool habitat.

A recent and important tool for vernal pool protection in Massachusetts was the completion and distribution of the first statewide inventory of potential vernal pools

(Burne, M. R. 2001. *Massachusetts Aerial Photo Survey of Potential Vernal Pools*. Natural Heritage and Endangered Species Program, Westborough, MA 01581). The inventory was conducted using 1:12000 scale, color infra-red, leaf-off aerial photographs. Potential pool locations were digitized and are available in GIS format on a compact disk, included in the report, and on the state's GIS website (www.ma.state.us/mgis). The inventory should be a valuable resource for those interested in or concerned about vernal pools, and is a valuable guide to the occurrence of potential pools, whose locations can be then be verified.

4:40 Landscape Variation in Seasonal Forest Pond Characteristics in Northern Forests

Brian Palik^{*1}, Darold P. Batzer², Richard Buech¹, LeAnne Egeland¹ and Dwight Streblow¹, ¹North Central Research Station, USDA Forest Service, 1831 Hwy. 169 E., Grand Rapids MN, ²Department of Entomology, University of Georgia, Athens, GA

Seasonal ponds are abundant in many forests, yet they remain poorly understood. We know little about landscape variation in pond densities, plant and animal communities, and hydrology. The potential for variation is great because different landscape settings vary in geologies, disturbance histories, and soil conditions, factors affecting ponds. We are studying ninety-two seasonal forest ponds in northern Minnesota to understand natural range of variation in pond densities and biophysical characteristics, as related to landscape features. Our goal, beyond increased ecological understanding, is to inform management and policy decisions affecting seasonal forest ponds and dependent organisms, particularly amphibians. We have found that seasonal ponds are highly abundant in northern forest landscapes, but that abundance varies widely and predictably with glacial landform. Our research demonstrates tremendous variation in biophysical characteristics of ponds, but that variation in some features is predictable from landscape-scale features. Landscape variation in invertebrate communities is high and taxa considered indicators of healthy ponds in other regions, e.g., fairy shrimp, do not occur predictably in northern forest ponds. Wood frogs are the only amphibians that breed consistently in northern forest ponds. However, this species makes important functional contributions to upland forests, making protection of breeding ponds paramount. Our research suggests that disturbance of adjacent upland forest has short-lasting effects on ponds; however, short-lasting changes are important if a threshold level of pond disturbance is reached in the landscape. We are now working closely with policy makers in Minnesota to translate our results into forest management guidelines for seasonal ponds.

February 21, 2002

8:05 Protection of Ephemeral Wetlands: Determination of Core Habitat and Buffers

Ray Semlitsch, Division of Biological Sciences, University of Missouri,
Columbia MO

Terrestrial habitats surrounding wetlands are of critical importance for the management of natural resources. It is well established that these terrestrial habitats are the sites of physical and chemical filtration processes that protect water resources (e.g., drinking water, fisheries) from increases in temperature, siltation, and chemical pollution caused by human activities such as timber harvesting, road building, agriculture, and urbanization. Further, it is generally acknowledged that buffer strips or riparian strips 30-60 m wide will effectively protect aquatic habitats. It is also apparent that terrestrial uplands surrounding wetlands are core habitat for many semi-aquatic species that depend on mesic ecotones to complete their complex life cycle. Frogs, salamanders, turtles, and snakes, for example, use areas a mean minimum of 129 meters from the wetland edge. Although the importance of this core habitat in maintaining biodiversity is obvious biologically, regulations to protect it as well as criteria to define this habitat, are less clear. More importantly, a problem is created for natural resource managers when regulations or ordinances, especially those of local or state governments, have been set based on criteria to protect water resources using buffer strips rather than to protect the core habitat of native species.

8:50 Spatial Distribution and Connectivity of Salamander Habitats: Implications for Conservation of Pond-breeding Amphibians

Evan Grant, Baltimore Ecosystem Study, 5200 Westland Boulevard - TRC 134
UMBC, Baltimore MD

Habitat fragmentation has been identified as a major threat to metapopulation structure in terrestrial vertebrates due to the disruption of dispersal corridors between groups of populations. Historical and current land use practices in Tompkins County have resulted in a landscape with patches of forest habitat varying in size and complexity located throughout the county. Many amphibians common to forests in this geographical region rely on the presence of both upland forest habitats for the adult life stage and temporary wetlands (vernal pools) for breeding and larval development. Using aerial photographs, National Wetlands Inventory maps, community mailings and word-of-mouth information, I located vernal pools within Tompkins County and combined these data in a Geographic Information System (GIS) along with a land use map to quantify the forest fragmentation around these vernal pools, and assess the suitability of the landscape for amphibian dispersal and metapopulation structure. Tompkins County is an ideal location to study fragmentation because it can be divided into two functionally distinct landscapes along a topographic discontinuity, which separates the county into northern and southern halves. The northern landscape has historically been in agriculture and is characterized by a greater number of smaller patches and greater distances among patches, which does

not facilitate dispersal among populations. In contrast, the southern landscape is more forested and thus exhibits smaller distances between forest patches, thus allowing dispersal among amphibian populations. My results of the fine-scale distribution of forest habitats in this landscape show that, given the limited dispersal ability and specific habitat requirements of amphibians, forest fragmentation can have profound effects on metapopulation structuring of these animals. It is necessary to focus amphibian conservation efforts centering on a landscape, which is relevant to these organisms, both in terms of their survival as well as their ability to exchange genetic information between population patches in a metapopulation.

9:10 The Ecology of Northern Flatwoods in Northeastern Illinois

Jim Anderson, Lake County Forest Preserve, 32492 North Almond Road,
Grayslake IL

The Northern Flatwoods is an uncommon community located in northeastern Illinois. In order to provide management recommendations this community was investigated to provide a working description of the floristic and faunal communities. Ecological factors such as, hydrology, topography, soils, species composition, and climatic conditions were also investigated for this community. This community is generally dominated by *Quercus bicolor*, *Fraxinus nigra*, and *Cephalanthus occidentalis* in the canopy and understory, and with a mix of graminoid and forb species on the ground layer. This community because of its unique hydrology provides excellent breeding and foraging habitat for amphibians and reptiles. Many of these species are rare or listed species. Several management concerns have been identified for this community including fire suppression, invasive woody species, and changes in hydrology. The critical ecological factors for these communities seem to be available light for the graminoid communities and the surrounding upland communities and the duration of the hydroperiod of the ephemeral ponds found in these communities.

9:25 Ephemeral Wetlands at the Terminal Edge of a Bedrock Confining Unit

Terry Lee, Environmental Services, Olmsted County, 2116 Campus Drive SE,
Rochester MN

The city of Rochester is among the fastest growing areas in Minnesota. In the last decade the city has experienced over 22% growth. As this trend continues, it becomes increasingly important to guide development to minimize impacts to critical natural resource features -- particularly the focused groundwater recharge areas that occur at the terminal edge of the Decorah shale. In this setting, groundwater from the upper limestone aquifer discharges through soils overlying the Decorah shale and recharges the underlying sandstone and limestone aquifers. Studies by the US Geological Survey suggest that about half of the City of Rochester's groundwater recharge occurs at the "Decorah Edge". This finding was particularly important considering that the source water has extensive nitrate and bacterial pollution. This setting extends from Minneapolis to the Iowa border -- a distance of approximately 100 miles. Surveys

suggest that the Decorah Edge is one of the most biologically diverse settings in the state. Minnesota Department of Natural Resources staff attributes that to the historical persistence of drought sensitive species in this setting as well as the difficulty in farming and developing the steep wet slopes.

10:20 Developer Perspective

Mac Airhart, Airhart Construction, West Chicago, IL

We will be comparing two single family developments in the Chicago Metropolitan area with wetlands, one successful and one problematic. Contrasting the two projects, we will look at the regulations, the process, and the land use decisions. We will offer suggestions as to how private property owners, developers and government agencies can be brought together into a workable partnership in this conservation effort.

10:40 Agriculture Perspective and Local Ordinances

Dave Brandt, USDA Natural Resources Conservation, 1143 North Seminary, Woodstock IL

Agricultural production is a major land use of many watersheds in the Chicago collar counties of Lake, McHenry, Kane and Will. The impacts of these cropland acres to the receiving waters are of major concern to watershed planning efforts. Ephemeral wetlands in a watershed provide benefits to water quality while decreasing runoff volume. Farmer attitudes to these ephemeral wetlands however, are often adversarial. Agricultural production goals and farmer workload concerns are two of the most common obstacles to ephemeral wetland protection or enhancement on cropland. The 1985 Farm Bill is a contributing factor to these farmer attitudes.

At the same time, elected officials and responsible staff in these urbanizing counties have developed ordinances to effectively deal with stormwater management. They recognize that the volume and quality of stormwater runoff is directly related to maintaining depressional storage volume and encouraging wetland protection.

11:00 Common Species are Supposed to be Common: An Overview of Midwestern Reptiles and Amphibians

Chris Phillips, Illinois Natural History Survey, 607 E Peabody, Champaign IL

Abstract not available at time of press

11:20 The Copperbelly Water Snake and Other Endangered Midwest Reptiles: the Importance of Shallow Wetlands

Bruce A. Kingsbury, Center for Reptile and Amphibian Conservation and Management, Indiana-Purdue University, Fort Wayne IN

A variety of imperiled reptiles of the Midwest are aquatic or semi-aquatic. Interestingly, many of these species are reliant in some fashion on shallow, often isolated, wetlands. Piecemeal loss of such areas should pose many of the same challenges for these reptiles as has previously been demonstrated for amphibians. Using the federally listed copperbelly water snake (*Nerodia e. neglecta*) as my primary example, I will show the critical value of such wetlands to the conservation of sensitive herpetofauna. I will also include information on several other species of snake and turtle to show that the problem extends well beyond the needs of the copperbelly.

12:55 Ephemeral Pond Restoration for Amphibian Conservation: A Case History from Vermilion County, Illinois

Jennifer M. Mui* and R. E. Szafoi, Center for Biodiversity, Illinois Natural History Survey, 607 E Peabody, Champaign IL

Wetland loss and fragmentation, among other factors, have been responsible for losses of amphibians at local and regional scales. Ephemeral wetlands, in particular, are critical to many amphibians and their value is generally poorly appreciated. As part of an endangered species management plan, an ephemeral wetland was restored adjacent to the existing habitat for Illinois' only known population of the silvery salamander. Restoration was achieved through excavation of fill material and planting of native trees and shrubs. Amphibians colonized the restored pond in the first year post restoration and species richness and abundance have increased over 5 years. This proved a successful and cost effective strategy for amphibian conservation and management at this site.

1:35 Faunal Perspective of Mitigation for Wetland Losses in Central Ohio

Deni Porej*¹ and Mick Micacchion², ¹The Ohio State University, Dept Evolution, Ecology and Organismal Biology, 1735 Neil Avenue, Columbus OH, ²Division of Surface Water, Ohio EPA, 122 South Front St., Columbus OH

The major goals of our research project are to: 1.) Identify within-wetland and landscape factors that affect re-colonization and establishment of amphibians in replacement wetlands; 2.) Develop predictive modeling of animal communities within replacement wetlands that can be used to improve design and identify most suitable sites for future wetland restoration projects; and 3.) Identify species most likely to be impacted by current wetland compensatory mitigation policies.

We studied amphibian communities of 31 individual replacement wetlands (1 to 10 years old), and 4 wetland mitigation banks located in the Ohio's Eastern Corn Belt Plains ecoregion. We examined within-wetland factors affecting amphibian diversity in replacement wetlands and compared their amphibian community composition with data on over 50 forested and emergent natural wetlands located in the same region.

FINDINGS:

Wetland size is not an important predictor of amphibian diversity in replacement wetlands in central Ohio. Predatory fish have negative impact on local amphibian species richness, and presence of a “shallow” vegetated region (slopes 1:15 and less) has a positive impact on local amphibian species richness. Bullfrogs, green frogs and toads are more common in replacement wetlands than in natural wetlands, but wood frogs and salamanders (in general) are underrepresented. Regional loss of forested wetlands is significant, and replacement wetlands (including wetland mitigation banks) do not provide adequate replacement for the loss of forest-associated amphibian fauna. Our data suggest that in order to maintain regional amphibian biodiversity, hydrological equivalence, landscape context and possibly amphibian re-introductions need to be incorporated into wetland mitigation requirements.

1:55 An Ephemeral WHAT land?: Toronto Zoo's Ephemeral Wetland Education Project

Sarah Ingwersen* and Bob Johnson, Toronto Zoo, 361A Old Finch Ave., Toronto ON

Ephemeral wetlands are unique wetlands that have an important role in the hydrological system. The run-off that is collected in the slight depressions in the landscape provides valuable habitat for a variety of species. In Ontario, ephemeral wetlands provide habitat for several of Ontario's amphibian species including the wood frog and the spotted salamander. Unfortunately, ephemeral wetlands are poorly understood and as a result they are often overlooked. The Adopt-A-Pond Programme at the Toronto Zoo is a community-based wetland conservation programme that works closely with educators, community groups, naturalist groups and families. Adopt-A-Pond focuses on conservation education on topics such as amphibian monitoring, habitat restoration, turtle conservation and ephemeral wetlands. Adopt-A-Pond is working to increase awareness and the opportunities for protection of these valuable wetlands. Adopt-A-Pond acts as a provincial coordinator to organize community involvement in this important conservation issue. This paper will discuss the development of our ephemeral wetland educational resources and initiatives that include registration opportunities, educational posters, restoration projects and training sessions.

2:15 Vernal Pool Education in Massachusetts

Scott Jackson, DNRC University of Massachusetts, Holdsworth Hall University of Massachusetts, Amherst MA

Interest in vernal pools generally followed from an interest in spotted salamanders and other vernal pool amphibians promoted by a handful of Massachusetts naturalists, teachers and scientists. Vernal pool education was instrumental in creating the political will to protect these ephemeral wetlands as part of Massachusetts wetlands protection regulations. The regulations reserved strongest protection for vernal pools that were “certified” by the Massachusetts Division of Fisheries and Wildlife. The certification process relied on volunteers who collected and submitted information documenting the

occurrence of vernal pools (based on a variety of indicator organisms) and locating those pools on the landscape. This certification process created an exceptional opportunity for education and resulted in numerous vernal pool certification workshops, as well as resource materials for lay naturalists and teachers. These resource materials included: a citizen's guide to vernal pool certification, curriculum guide for teachers, slide collections available to educators, poster, web site, email listserv, t-shirts and, most recently a field guide to vernal pool organisms. This combination of education and citizen involvement in habitat protection has resulted in a high degree of vernal pool literacy in Massachusetts.

3:15 Land Trusts and Conservation Easements

Bill Davis, The Conservation Foundation, 10 S 404 Knoch Knolls Road
Naperville, IL 60565

Ephemeral wetlands must be protected to survive. Government agencies, however, lack the financial resources and will to protect more than a sample. There is another resource to turn to---the 1,200-plus land trusts in the United States. These organizations, which vary greatly in size and character, operate independently of government to help save our natural heritage. Utilizing a "toolbox" of preservation strategies and techniques, they have become experts at helping interested citizens find ways to protect their land in the face of growing development pressures. Land trusts have been extraordinarily successful, having protected more than 6.2 million acres of open space. One tool that has proved to be especially useful is the conservation easement. A conservation easement is a legal instrument under which a landowner---either by sale or donating---gives up rights to develop land, thus preserving it for a conservation purpose. The conservation easement document spells out what can, and cannot, be done on a property now and in perpetuity. Conservation easements are becoming increasingly popular because they allow a private landowner to protect the conservation values of a property and to be rewarded for doing so by receiving tax benefits.

3:30 Partners in Amphibian and Reptile Conservation (PARC) Mission and Products

Bruce Kingsbury, Center for Reptile and Amphibian Conservation and
Management, Indiana-Purdue University, Fort Wayne IN

Partners in Amphibian and Reptile Conservation, or PARC, is a loose-knit consortium of individuals and organizations with an interest in herpetofaunal conservation. It has no central facilities, but instead is reliant on those available to its members. The mission of PARC is simple: to conserve amphibians, reptiles and their habitats as integral parts of our ecosystem and culture through proactive and coordinated public/private partnerships. In this presentation, Bruce Kingsbury, Coordinator for PARC Midwest, will provide a brief overview of PARC structure, and highlight some PARC activities. For more information about PARC, visit their website at: <http://parcplace.org>. For more information specific to the Midwest, visit <http://herpcenter.ipfw.edu/parcmw.htm>.

3:40 The Role of DAPTF in Amphibian Conservation and Wetland Preservation

Michael J. Lannoo, Muncie Center for Medical Education, Indiana University
School of Medicine, MT 201, Ball State University, Muncie, Indiana 47306

Worldwide reports of amphibian population declines and malformations prompt concern about species protection. In 1990, the Species Survival commission of the IUCN (World Conservation Union) established the Declining Amphibian Populations Task Force. This unique network of experts is now composed of 108 Regional Working Groups exploring relationships between amphibian declines, habitat loss, chemical contaminants, climate change, and disease. The U.S. Working Group, in conjunction with PARC, has spent the past 3+ years assembling a project entitled "Status and Conservation of U.S.

Amphibians." This book, which will be published by the University of California Press, consists of 2 volumes: 1) conservation essays and 2) detailed accounts, written by experts, of each of the 280 species found in the U.S. We have also created new range maps for each species in a digital format, which permits the exploration of relationships between amphibian distributions and environmental factors.

3:50 The Status of Regulatory Mechanisms to Protect Ephemeral Wetlands

Julie M. Sibbing, National Wildlife Federation, Office of Federal and Legislative Affairs, 1400 16th St. N.W. - Suite 501, Washington DC

The functions and values of ephemeral wetlands are frequently under-appreciated by federal and state regulatory programs. Especially vulnerable are those ephemeral wetlands that are not connected to other waters. For years, destruction of these systems was approved in an expedited manner under the Army Corps of Engineers Nationwide Permit 26. Now a more serious threat faces these valuable amphibian breeding habitats. In January 2001 the U.S. Supreme Court ruled in *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers et al. (SWANCC)* that Clean Water Act protections do not extend to "isolated" waters. This ruling eliminated Clean Water Act protection for many ephemeral wetlands (along with many deeper water areas), leaving them vulnerable to both destruction for development and discharges of pollutants. In some states, especially in the Northeast, pre-existing state laws maintained protection for "isolated" wetlands. Since the ruling, a few other states have acted to pass legislation or expand the use of existing laws to ensure continued levels of protection for "isolated" waters. Yet in significant areas of the country, these systems have been left unprotected. This presentation will provide an update on the status of protection for ephemeral wetlands, including a summary of their treatment under new Nationwide Permits, current legal and agency interpretations of the SWANCC decision, the status of efforts to amend the Clean Water Act to restore protection for "isolated" waters, and state and local policy trends to address "isolated" wetland protection.

4:10 Regulation of Isolated (Non-federal) Wetlands in Wisconsin - the Wisconsin Response to SWANCC

P. Scott Hausmann, Wisconsin Department of Natural Resources, Box 7921,
Madison WI

On May 7, 2001, Wisconsin Governor Scott McCallum signed Special Session Senate Bill 1, a measure that provides protection to over one million acres of isolated wetlands throughout Wisconsin that were potentially left unprotected as a result of the "SWANCC" decision by the U.S. Supreme Court. The law restores, effective on May 8, 2001, WDNR authority to regulate non-federal wetlands (those left unprotected by the SWANCC decision) by requiring that the proponent receive a water quality certification from WDNR. The process is essentially the same as the current process for wetland water quality certifications in Wisconsin - "No person may discharge dredge or fill material unless the discharge is authorized by a water quality certification issued by the department." or unless they qualify for an exemption. Current successes and problems with the new legislation will be described as well as how and (possibly) why the legislation was passed quickly and unanimously by both legislative houses.

4:30 Wetlands Conservation Funding From NRCS

Dave Brandt, USDA Natural Resources Conservation, 1143 North Seminary,
Woodstock IL

There are several United States Department of Agriculture (USDA) programs available to landowners of cropland or marginal pasture land to enhance or restore wetlands which could include ephemeral wetlands. The Wetland Reserve Program (WRP) purchases easements and provides dollars for wetland restoration to include upland buffers. The Wildlife Habitat Incentive Program (WHIP) provides cost share dollars for the establishment of wildlife habitat plans which could include ephemeral wetlands and the adjacent uplands. The Conservation Reserve Program (CRP) provides annual rental payments for 10 to 15 years and initial cost share for the establishment of upland or wetland wildlife habitat.

4:45 Wetlands Conservation Funding from USF&WS

Christie Deloria-Sheffield, US Fish and Wildlife Service, Barrington IL

Unfortunately money doesn't grow on trees....or in wetlands...but don't despair there are many opportunities for acquiring funds and getting your restoration project underway. If you are not a full time grant writer, finding funding sources and understanding grant processes can be overwhelming or even confusing. This presentation will help you get a jumpstart on finding and securing grant funds for habitat restoration projects. There are many federal, state, local and private organizations who are interested in habitat restoration and who provide money for restoration projects. I will provide examples of programs, locally and nationally, which assist in habitat restoration projects. Once you find a funding source that matches your project, the next challenges are submitting an application and acquiring funding. Some helpful tips will be presented which will strengthen your application and help your project receive funding.

5:05 Wetlands Conservation Funding From USEPA

Cathy Garra, USEPA Region 5, 77 West Jackson, Chicago IL

The United States Environmental Protection Agency (USEPA) contributes to several funding programs with potential for wetlands conservation projects. Most funding comes from the Clean Water Act, which has a strong water quality emphasis. Grants are competitive and some are administered by State water agencies or other partners. Most have an annual funding cycle with projects lasting for one or two years. Potential grant programs include the Wetland Program Development Grants, Environmental Education Grants, Five Star Restoration Program, non-point source Section 319 grants and State Revolving Fund loans. See the "Financial Assistance" section at <http://www.epa.gov/owow/wetlands> for current information.

**U.S. EPA REGION 5
MIDWESTERN EPHEMERAL WETLANDS: A VANISHING HABITAT
CONFERENCE**

POSTER ABSTRACTS

Indiana Herp Atlas

Bob Brodman, Department of Biology, Saint Joseph's College, Rensselaer
IN

The Indiana Herp Atlas is a four year study (1998-2001) using standardized NAAMP protocols to estimate the abundance, distribution, and status of amphibians and reptiles throughout the state. A dozen principle investigators surveyed and monitored populations in approximately half of Indiana's counties. Here I present data on amphibian surveys from 23 counties in northern and southwestern Indiana. The results indicate that amphibians are more abundant and diverse in the state DNR nature preserves, forests, fish & wildlife areas and parks with those from randomly chosen routes. The number of wetlands in a preserve is more strongly correlated with amphibian abundance than the size of the preserve. Most amphibian populations encountered inhabit isolated ephemeral wetland habitats indicating that the protection of isolated ephemeral wetlands, both within state and private properties, are crucial to the conservation of amphibians.

Fairy Shrimp in Midwestern Ephemeral Wetlands

Joan Jass and Barbara Klausmeier, Department of Zoology, Milwaukee Public
Museum, 800 W Wells, Milwaukee WI

Midwestern fairy shrimp (Anostraca) have life cycles whose seasonal stages are inextricably tied to temporary ponds. Research on the physical and chemical parameters that influence development of encysted anostracan eggs has shown how habitat factors determine the survival of spring hatching fairy shrimp at a particular site. After mating in spring, females release encysted eggs, which sink to the bottom of the pond. These are called resting eggs because they require a summer of rest, before the pre-hatch of autumn. Then, as the pond dries up, the cysts are exposed to the air, which is high in oxygen and cool in temperature, a combination which causes pre-hatch to occur. During pre-hatch, the outer protective layer of the cyst opens, exposing the embryo, which is still enclosed inside an inner cuticle. After autumn, the population is very vulnerable to being destroyed by dryness. Lack of winter precipitation can destroy pre-hatched eggs, whose immediate surroundings must remain moist. Hatching is completed and larvae become free-swimming when the pond site inundated in spring. With sufficient oxygen in the cold water from snowmelt and spring rains, it is the rising amount of carbon dioxide that is the final stimulus for successful hatching. We have followed this cycle through a series of monthly photographs of two temporary ponds at a Waukesha County, Wisconsin, site. Four of these photographs were used to illustrate the "Change Through the Seasons" page of the Midwestern Ephemeral Wetlands brochure.

The Response of Algal Communities to Logging in Ephemeral Forest Wetlands

Trevor J. Krabbenhoft, Anthony T. Miller, Malcolm G. Butler and Mark A. Hanson, Department of Biology, North Dakota State University, Stevens Hall, Fargo ND

Ephemeral forest wetlands are intimately connected to the adjacent upland forest. Human impacts to this adjacent forest can have direct effects on wetland biotic communities. Forest wetlands in northern Minnesota frequently undergo unregulated clear-cut logging, the ecological impacts of which are not fully understood. We analyzed the logging-induced effects of altered water chemistry and reduced canopy cover on algal diversity and abundance in ephemeral forest wetlands. Using direct ordination techniques (RDA), we found that algal community composition was not significantly affected by different logging techniques (i.e. clear-cut, partial-buffer, full-buffer), or by water chemistry differences, but the Multi-Response Permutation Procedure (MRPP) found that overall abundances of various taxa increased with reduced canopy cover.

Aquatic Communities in Northern, Ephemeral Forest Wetlands: Characteristics and Influences of Deforestation

Anthony T. Miller*, Mark A. Hanson, and Malcolm G. Butler, Department of Biological Sciences, North Dakota State University, 197 E Court, University Village, Fargo ND

Using exploratory analysis, I assessed natural variation and responses to experimental timber harvest by aquatic invertebrate communities in 16 seasonally flooded wetlands in old-growth (70+ years since harvest) aspen stands in north central Minnesota. In the post-treatment year, I also assessed responses of algae and other wetland physical features to the experimental treatments.

Pre-treatment analysis of aquatic invertebrate communities revealed that wetland hydroperiod and organic carbon concentration influenced invertebrate distribution and abundance, although wetland spatial differences between clusters accounted for the greatest variation. Post-treatment analysis also indicated strong influence of hydroperiod, carbon concentration and spatial variation on invertebrate communities. Additionally, wetlands associated with clear-cut treatments had longer hydroperiods, increased primary productivity, and both positive and negative invertebrate responses. Algae exhibited no significant response to treatment or measured environmental variables.

Biogeographical Profiles of Shorebird Migration in Midcontinental North America <http://www.mesc.usgs.gov/shorebirds>

Susan K. Skagen*¹, Peter B. Sharp², Robert G. Waltermire¹, M. Beth Dillon¹, ¹U.S. Geological Survey, Biological Resources Division, Midcontinent Ecological Science Center, Fort Collins, CO and ²Institute for Wildlife Studies, Avalon CA

Shorebirds (families Charadriidae, Recurvirostridae, and Scolopacidae) are dependent on wetlands in the interior plains for resting and refueling during spring and fall migrations. This poster describes an intensive data synthesis and computer mapping project with the following objectives: To identify the uniqueness of different regions of the interior plains of North America to migrating shorebirds. To provide information to land managers on distribution, chronology, and habitat requirements of en route migrants. To stimulate the formation of testable hypotheses regarding migration strategies of individual shorebird species.

Comparison of Microcrustacean Community Structure in Ephemeral Ponds among the Terrestrial Ecoregion of Oklahoma

Gabriel B. Cosyleon* and Steve S. Schwartz, Department of Zoology, Oklahoma State University, 430 Life Sciences West, Stillwater OK

Although ephemeral ponds are ubiquitous and provide habitats for many invertebrates with a variety of life history characteristics, our knowledge of faunal community structure is weak. Patterns of species diversity can be attributed to the surrounding environment, prevailing soil type in which the habitat resides, biotic interactions (predation, competition) and chance events (whether a propagule has reached the habitat).

Many species exist as metapopulations in fragmented landscapes, but persist regionally by dispersal to nearby habitats. The use of naturally occurring patchy habitats as a model of fragmentation in a human dominated landscape can aid the understanding of how environmental degradation impacts the metapopulation dynamics. Temporary isolated wetlands by definition are broadly distributed and occur in nearly all terrestrial habitats. In ephemeral wetlands an ecoregional foundation aids in determining quantitative biological and regional chemical criteria which is critical to protecting aquatic ecosystems.

We tested the hypothesis that established terrestrial ecoregions are adequate predictors of ephemeral pond community structure. We sampled 140 temporary ponds over a three-month period from the 11 terrestrial ecoregions of Oklahoma for microcrustaceans. Water samples were taken and analyzed for specific conductivity, pH and temperature. Crustacean samples were taken using a dip net consisting of a 153 μ m mesh. Presently, 43 species have been identified in 15 habitats and continued classification and data analyses efforts are in progress.

Enhancing Amphibian Biodiversity on Golf Courses through Use of Seasonal Wetlands.

Brian S Metts, David E. Scott, and J. Whitfield Gibbons. Savannah River Ecology Laboratory, University of Georgia, P.O. Drawer E, Aiken, SC USA 29802.

Ecologists generally recognize the value of seasonal wetlands, but these wetlands are often ignored in landscape management decisions and practices, including golf course design. We sampled the amphibians and reptiles that use wetland habitats on five golf courses for three years in the sandhills of South Carolina and Georgia, and compared these survey data to concurrent surveys at ten nearby (off-course) seasonal wetlands. Two of the courses sampled have on-course seasonal wetlands, which allowed us to compare amphibian diversity on these courses to the other three courses that do not have seasonal wetlands.

Permanent wetlands were more numerous than seasonal wetlands on the golf courses we sampled. However, greater amphibian species richness occurred at both off-course and on-course seasonal wetlands compared to golf course permanent lakes and ponds—26 species were sampled at comparison seasonal wetlands, 16 species at the two courses with seasonal wetlands, and 11 species at the three courses with only permanent water. Most of the course wetlands harbored numerous fish species, and these wetlands contained only the few amphibian species that can tolerate fish. The difference between the species lists for golf courses with and without seasonal wetlands results primarily from the presence of amphibian species that “prefer” fish-free wetlands on the courses that have seasonal wetlands, such as {*Ambystoma opacum*} (marbled salamander), {*Ambystoma maculatum*} (spotted salamander), and {*Gastrophryne carolinensis*} (eastern narrow-mouthed toad). These results demonstrate that the incorporation of seasonal wetlands into the design of the golf-course landscape would enhance amphibian biodiversity.

**A Summary of Conservation Efforts Of Forested Ephemeral Wetlands
Undertaken By The Forest Preserve District Of Will County**

David Mauger, Forest Preserve District of Will County, Joliet, Illinois

The Forest Preserve District of Will County has been actively involved in preservation and restoration of ephemeral wetlands since 1997. A primary conservation goal has been to preserve populations of rare or uncommon amphibian species restricted to the forest ecosystem by protecting both upland and wetland habitat. The wetlands provide breeding habitat, while associated forest uplands provide habitat for terrestrial adults or juveniles. Rare or uncommon amphibian species include blue-spotted salamander (*Ambystoma laterale*), spotted salamander (*A. maculatum*), four-toed salamander (*Hemidactylium scutatum*), wood frog (*Rana sylvatica*), spring peeper (*Pseudacris crucifer*) and eastern gray treefrog (*Hyla versicolor*). The first project was to preserve and restore a small, forested depression at Goodenow Grove Nature Preserve (Fairways Project). The second was a larger initiative started in 1998 to preserve a large buttonbush shrub swamp and several wet-mesic forest depressions within a matrix of oak forest next to the District's Lower Plum Creek Preserve (Timberline Shrub Swamp). These projects illustrate the challenges that exist in changing attitudes and perspectives relative to how wetland function and importance is assessed, and ultimately in how mitigation policy is implemented. The projects increased awareness of the importance of forested ephemeral wetlands within the Chicago Region, as well as highlighting the need to preserve the larger landscape mosaic that includes both the wetlands and surrounding forest.